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Superfund Record of Decision (EPA Region 5)
Main Street Well Field, Elkhart, Indiana
August 1985

(U.S.) Environmental Protection Agency
Washington, DC

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Superfund Record of Decision:

Main Street, IN

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16. ABSTRACT

The city of Elkhart is located in north central Indiana in Elkhart County. Three well fields supply drinking water to approximately 37,000 of the city's residents. Main Street Well Field is the largest of the three well fields consisting of 15 wells on 10 acres, and supplies 70-80 percent of the city's water needs. In April 1981 during an U.S. EPA Groundwater Supply Survey, volatile organic compounds were detected in water furnished from Main Street Well Field. The compounds detected included trichlorethylene (TCE), 1,2-dichlorethylene, 1,1,1-trichlorethane and 1,1-dichlorethane. Concentrations of contaminants ranged from 2.0 parts per billion (ppb) of 1,1-dichlorethane to 94 ppb of TCE.

The selected remedial action includes construction of air stripping facilities to remove volatile organic compounds from the contaminated flow from the Main Street Well Field. The treated water will be discharged to the existing water treatment plant and distribution system. Total capital cost of the selected remedial alternative is estimated to be $1,106,000 with O&M costs estimated to be an additional $158,000 per year.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field Group
Record of Decision Main Street, IN Contaminated Media: gw, soil Key contaminants: VOCs, trichlorethylene (TCE), 1,2-dichlorethylene (1,2-DCE), 1,1,1-trichlorethane, 1,1-dichlorethane, and tetrachlorethylene (PCE)		

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Record of Decision

Remedial Alternative Selection
Operable Unit for Provision of
Alternate Water Supply

Site

Main Street Well Field
Elkhart, Indiana

Documents Reviewed

This decision is based on the following documents describing the analysis of cost-effectiveness of interim remedial alternatives for the Main Street Well Field site:

- Phased Feasibility Study for Main Street Well Field, Elkhart, Indiana, Camp Dresser & McKee, May 29, 1985, and ADDENDUM
- Summary of Remedial Alternative Selection
- Responsiveness Summary
- Memorandum from Steve Rothblatt, Chief, Air and Radiation Branch to Richard Bartelt, Chief, Emergency and Remedial Response Branch
- Memorandum from Joseph Harrison, Chief, Safe Drinking Water Branch to Richard Bartelt, Chief, Emergency and Remedial Response Branch
- Memorandum from Robert A. Schaefer, Regional Counsel and Basil G. Constantelos, Director, Waste Management Division to Valdas V. Adamkus, Regional Administrator
- Letters from Woodrow A. Myers, Jr., M.D., State Health Commisioner, Indiana State Board of Health to Valdas V. Adamkus, Regional Administrator

Description of Selected Remedy

Construct air stripping facilities to remove volatile organic compounds from the contaminated flow from the Main Street Well Field. The treated water will be discharged to the existing water treatment plant and distribution system. The operable unit serves a dual purpose, provision of an alternate water supply and management of groundwater migration.

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Declarations

Consistent with the Comprehensive Environmental Response Compensation and Liability Act of 1980, and the National Contingency Plan (40 CFR Part 300), I have determined that construction of air stripping facilities to treat contaminated water for municipal water system treatment and distribution is a cost-effective interim remedial action (operable unit) and provides adequate protection of public health, welfare, and the environment. The State of Indiana has been consulted and agrees with the approved remedy. In addition, the action will require future operation and maintenance activities to assure the continued effectiveness of the remedy. These activities will be considered part of the approved action and eligible for Trust Fund monies for a period not to exceed one year.

It has also been determined that the action being undertaken is consistent with permanent remedy at the site, and is appropriate when balanced against the availability of Trust Fund monies for use at other sites.

The U.S. Environmental Protection Agency is continuing its remedial investigation/ feasibility study (RI/FS) of the Main Street Well Field site to define extent of contamination, evaluate potential sources of contamination and the hydraulic characteristics of the aquifer in order to evaluate potential final remedial actions. If additional remedial actions are determined to be necessary, a Record of Decision will be prepared for approval of the future remedial actions.

August 2nd, 1985

Date

Valdas V. Adamkus

Regional Administrator

U.S. EPA, Region V

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NARRATIVE SUMMARY

Main Street Well Field
Elkhart, Indiana

1. Site Location and Description

The City of Elkhart is located in north central Indiana in Elkhart County. Three well fields supply drinking water to approximately 37,000 of the City's residents. Main Street Well Field is the largest of the three well fields consisting of 15 wells on 10 acres, and supplies 70-80% of the city water needs. It is centrally located in the City of Elkhart, with residential and industrial areas on its border to the south and east respectively.

The Main Street Well Field is part of the St. Joseph River Basin area. Christiana Creek, a tributary to the St. Joseph River, enters the well field at the northwest corner and flows across the site in two major channels before exiting at the southeast corner. The Main Street Well Field was designed to utilize a man-made recharge pond system. Flow is diverted from Christiana Creek to numerous ponds that recharge the shallow water table aquifer. All 15 of the wells in the field pump to two storage tanks before chlorination and pumpage to distribution.

The aquifer system in northwest Elkhart County consists of coarse sand and gravel deposits averaging 175 feet in thickness. In the Main Street Well Field area, sand and gravel (glacial outwash) occurs to depths ranging from 42 to 58 feet. Below this is a silt and clay layer, which is believed to slope to the west. The soil at the site is Oshtemo loamy sand to depths of about 14 inches. This soil is described as a deep, well-drained soil on glacial outwash with an estimated permeability of .04 cm/sec.

The underlying deposits consist of generally fine to medium sand and gravel, with coarse sand and gravel content increasing to the east of the site. The permeability of the aquifer is in the range of .18 to .08 cm/sec. The underlying clay and silt layer has an estimated permeability of 1.6×10^{-7} cm/sec.

The direction of regional groundwater flow is generally south, towards the St. Joseph River and its tributary, Christiana Creek. In the well field area there is a westerly component to the flow, particularly toward the eastern border of the well field. The groundwater flow in this area is subject to influence by natural factors, such as Christiana Creek and by groundwater pumpage and recharge. The effect of the Main Street Well Field on groundwater flow patterns is dependent upon groundwater levels; the number, location and rate of pumping of the supply wells; and recharge from Christiana Creek.

2. Site History

In April of 1981 during an U.S. EPA Ground Water Supply Survey, volatile organic compounds (VOC's) were detected in finished water from the Main Street Well Field. The compounds detected included trichlorethylene (TCE), 1,2-dichlorethylene (1,2-DCE), 1,1,1-trichlorethane, and 1,1-dichlorethane. Concentrations of contaminants ranged from 2.0 parts per billion (ppb) of 1,1-dichlorethane to 94 ppb of TCE.

A combined effort by the U.S. EPA, the Indiana State Board of Health (ISBH) and the City of Elkhart was then undertaken to determine the sources of contamination. All 15 production wells plus 5 observation wells were sampled between July and October of 1981. Trichlorethylene (TCE) was found in 13 of the 15 production wells at or above the detection limit. The highest concentration of TCE in a production well was 880 ppb, which represents a 2.1×10^{-4} cancer risk level. The highest concentration detected in the observation wells at the eastern end of the well field was 3300 ppb of TCE, which represents an 1.2×10^{-3} cancer risk level. Other VOC's were also detected, but none as consistently or at levels as high as TCE. These contaminants are believed to be degradation products of TCE. The most contaminated wells lie on the eastern sections of the well field. Potential sources of contamination were indicated northeast of the field.

In an effort to bring TCE concentrations in finished water down to acceptable levels, five production wells from the contaminated eastern area of the field were removed from service. Additionally, two interceptor wells were installed by the City in 1982 to prevent further introduction of contaminants into the well field. A sampling schedule to monitor TCE concentrations in finished water and in production and observation wells was also established by the City. Pumping practices were altered so that less contaminad wells were pumped more heavily. Pumpages from the City's other two existing well fields were also increased to meet water supply demands.

Despite these strategies, a steady increase in TCE concentrations in finished water has occurred since 1982. In late 1983, two wells from the previously uncontaminated western area of the field began to show high TCE concentrations. In 1984, the finished water from the Main Street Well Field exceeded the 1×10^{-6} cancer risk level at an 87 percent frequency; during May through August, the period of highest historic water demand in Elkhart, the finished water exceeded the 1×10^{-6} cancer risk level at a 95 percent frequency. The following table compares the values for 1982 through 1985.

Main Street Well Field Finished Water

Period	Frequency of Exceeding 1×10^{-6} Cancer Risk	TCE Concentration, ppb		
		Average	High	Low
Year Round				
1982	15%	1.8	3.9	0.62
1983	33%	2.4	4.09	0.90
1984	87%	4.4	9.36	1.08
1985 (Jan-June)	56%	3.3	5.19	1.52
May August				
1982	40%	2.6	3.9	1.29
1983	24%	2.55	4.09	1.04
1984	95%	4.1	7.93	1.08
1985 (May-June)	100%	4.4	5.19	3.85

A survey conducted by the City of Elkhart identified two industries, Durakool and Excel, as potential sources of contamination of the well field. This was later confirmed by monitoring wells located between production wells and these industrial sites.

In late 1982, the Durakool and Excel individually contracted with Clyde E. Williams and Associates to prepare independent reports investigating the extent of TCE contamination and recommended remedial alternatives. The soil data available from the reports showed TCE concentrations on these properties ranged from 60 ppb to 570,000 ppb. Subsurface soils showed extensive TCE contamination to depths of 40 feet. Maximum concentrations occurred at 12 to 16 feet (20,000 ppb) with concentrations to 4,000 ppb at 37.5 to 40 feet on the Durakool property, and 4 to 8 feet (270,000 ppb) with concentrations to 5,300 ppb at 37.5 to 40 feet on the Excel property.

The proximity of the two industrial sites to the wells indicates that contamination percolating from these areas may be captured within the drawdown cone of the production wells and ultimately appear in the public water supply. Deep soil borings (up to 40 ft) suggest that TCE, being denser than water, has vertically leached and settled to the gray clay silt layer, where it forms a zone of contaminated soil in and above the layer at each of the probable source sites.

3. Current Site Status

All 15 wells in the Main Street Well Field have shown measurable levels of TCE. Ten of the 15 wells have shown levels of TCE greater than 2.3 ppb, the 1×10^{-6} cancer risk level (U.S. EPA Carcinogen Assessment Group). As of March 1985 sampling by U.S. EPA, 7 of the 15 wells exceed the 1×10^{-6} cancer risk level for TCE. The level of TCE detected in finished water from Main Street Well Field thus far in 1985 ranges between 1.52 and 4.39 ppb. This does not fully reflect the May through August period of historical heavy demand, during which time more of the contaminated wells must be incrementally put into production, resulting in increased levels of TCE and other VOCs in the water provided to the public.

Tetrachlorethylene (PCE), previously undetected at significant levels in the well field, was recently detected in the westernmost wells at a level of 9.0 ppb. This corresponds to a cancer risk level of 9×10^{-6} and suggests an additional western source of contamination may exist. Trans-1,2-dichlorethylene (trans- 1,2-DCE), was also detected in half of the wells sampled at levels ranging from 1.2 - 4.6 ppb. A 10^{-6} cancer risk level has not been established for this compound.

The contaminated soils identified through previous studies have not yet been removed. The RI/FS planned to begin in the fall of 1985 will address all necessary source control and soil removal issues.

Other U.S. EPA actions instigated in July 1985 under the removal program are being conducted in Elkhart that relate to residents with contaminated private wells (see Attachments 2 and 3). Concentrations of TCE and other VOCs in private wells have ranged from 0.7 to 19,380 ppb of TCE. These recent findings have led to either emergency hook-ups to city water for some residents or dispensing bottled water to others. It is possible that removal actions will replace the temporary provision of bottled water to these affected residents with hook up to City water. Though these incidents appear as yet unrelated to Main Street Well Field, they are indicative of the vulnerability to contamination of ground water in the Elkhart area. As more and more contaminated areas in Elkhart are identified (see Attachment 4), providing a safe drinking water source is imperative.

4. Enforcement

See Appendix.

5. Toxicity of Pollutants

Five of the identified compounds in the drinking water from Main Street Well Field, trichlorethylene, tetrachlorethylene, 1,1,1-trichloroethane, 1,1-dichloroethylene, and 1,2-dichloroethane, are suspected human carcinogens based on research done by various entities. These compounds are not yet regulated by the Safe Drinking Water Act, but are currently in the regulatory promulgation process.

The U.S. EPA Cancer Assessment Group (CAG) has established cancer risk levels for the suspected carcinogens found at Main Street Well Field. The 1×10^{-6} cancer risk levels established by the CAG are listed below:

Contaminant	1×10^{-6} Excess Lifetime Risk (Carcinogenicity) (ppb)	Longer-Term Health Advisory (Toxicity) (ppb)
Trichlorethylene (TCE)	2.8	75
Tetrachloroethylene (PCE)	1.0	20
1,1,1-trichlorethane	21.7	1070
1,1-dichlorethylene	0.23	70
1,2-dichlorethane	0.95	Not established

The 1×10^{-6} cancer risk level represents the estimated contaminant concentration in drinking water which would result in an additional incident of cancer per one million people. The cancer risk levels assume ingestion of two liters of drinking water per day for 70 years by a 70 kilogram adult. Drinking water is considered acceptable for consumption if it does not exceed the 10^{-6} cancer risk level. Longer term health advisories, which address toxicity of the compounds, are based on ingestion of 1 liter per day of drinking water for up to 2 years by a 10 kilogram child.

It can be seen that the concentrations of trichloroethylene and tetrachlorethylene have consistently exceeded the 10^{-6} cancer risk level. In addition to these five suspected carcinogens, two other VOCs, trans-1,2-dichloroethylene and 1,1-dichloroethane, have been detected at the well field. A 10^{-6} cancer risk level has not been established for trans-1,2-dichloroethylene; however, a 10-day health advisory of 270 ppb has been established. No health risk numbers, either toxicity or carcinogenicity, have yet been established for 1,1-dichloroehtane.

6. Threat to Public Health

The contaminants present in the ground water at the Main Street Well Field present a threat to the public health. Approximately 37,000 people are potentially affected. The public is exposed to the contaminants from the ground water after pumpage and distribution through the City water system to the tap. Three primary exposure routes exist: ingestion of water, dermal absorption from bathing, and inhalation of vapors released from the water during bathing and other uses.

The contaminants present at Main Street Well Field are chlorinated compounds. Chlorinated compounds are irritants to the eyes and/or mucous membranes. They are highly or moderately toxic via oral and/or inhalation routes. Of the above three primary exposure routes due to contaminated tap water, current knowledge and data limit a quantitative risk estimation

to a calculated cancer risk estimation due to ingestion only.

The Agency prepared a health effects evaluation in the Phased Feasibility Study for the Main Street Well Field site (Chapter 4). The purpose of the evaluation was to determine the potential public health risks associated with continuing to use the contaminated ground water as a municipal water supply.

Both present and potential health risk evaluations were performed, as presented in the Addendum: Estimation of Risk to Public Health. The present risk evaluation was performed utilizing current concentrations in individual wells at Main Street Well Field, employing the same pumping strategy as used by the City, which in essence is pumping from the least contaminated wells preferentially, and incrementing with remaining least contaminated wells to meet demand.

The potential health risk evaluation was also performed utilizing current concentrations in individual wells, but employing an inverse pumping strategy, pumping from the most contaminated wells preferentially, and incrementing with remaining most contaminated wells to meet demand. Several reasons for the need of this approach are presented below.

Because of past intrusion of contaminants, areas of the well field undoubtedly contain contaminated soils as well as contaminated ground water. As more wells are brought on-line to meet increasing demand, the risk of tapping contaminated ground water increases even if new introdution of contaminants into the well field is prevented. As pumpage increases, groundwater flow patterns shift. As a result, the contaminant plume is drawn to the area of highest pumpage.

Additionally, westernmost wells not previously contaminated have recently shown elevated contaminant levels. These wells show contamination not only by trichloroethylene (TCE), but tetrachlorethylene (PCE) as well. PCE has not been detected in the observation wells in the eastern end of the well field toward the known potential responsible parties, and has been previously undetected in any production wells in the Main Street Well Field. PCE is not thought to be a breakdown product of TCE. Hence, an additional western source is suspected. Groundwater contamination by VOCs, detected in industrial process wells west of and in proximity to Main Street Well Field, adds validity to these suspicions.

Table 1 summarizes the estimated public health risks associated with continuing use of the contaminated ground water from Main Street Well Field as a source of drinking water. It should be noted that the risk estimates presented in Table 1 consider TCE and PCE only. Three other suspected human carcinogens have also been detected in the ground water at Main Street Well Field. Two of these compounds, 1,1-dichloroethylene and 1,2-dichloroethane with 1×10^{-6} cancer risk levels of 0.23 ppb and 0.95 ppb respectively, have cancer risk levels even lower than PCE (1.0 ppb) and TCE (2.8 ppb). However, insufficient number of analyses exist for these other VOCs to accurately use their presence in these risk evaluations. As such, the estimates may understate the risk due to ingestion of drinking water from Main Street Well Field.

As presented below in Table 1, the present health risk for drinking water from Main Street Well Field consistently exceeds the 1×10^{-6} cancer risk level. The 1×10^{-6} cancer risk level represents the estimated contaminant concentration in drinking water which would result in an additional incident of cancer per one million people. Furthermore, the potential health risk evaluation indicates that the public health risk may approach 1×10^{-5}.

Pursuant to developing Agency policy the 1×10^{-6} cancer risk level for drinking water is the action level for providing an alternate water supply. At this level of contamination, the threat to public health is sufficient to warrant taking interim measures before final remedial measures are implemented.

Table 1.
Summary of Estimated
Cancer Risk for Main
Street Well Field Water

	Present Risk	Potential Risk
Average Daily Demand	1.8×10^{-6}	7.6×10^{-6}
Daily Demand During Maximum Month	1.4×10^{-6}	6.1×10^{-6}
Maximum Daily Demand	1.8×10^{-6}	4.3×10^{-6}
Full Capacity	3.9×10^{-6}	4.3×10^{-6}

7. Alternatives Evaluated

An operable unit is a discrete response measure that is consistent with a permanent remedy, but is not the permanent remedy in and of itself. This is consistent with the practice of phasing remedial action at sites that present complex cleanup problems.

The primary objective of the Main Street Well Field operable unit is to protect public health by providing a reliable supply of safe, potable water to those consumers currently dependent on the Main Street Well Field. The long-term remedial measures will likely include minimizing and mitigating groundwater contamination affecting Main Street Well Field. The selected remedy achieves the primary objective and works towards the likely final remedial measure(s).

Numerous alternatives were identified and evaluated for potential as an operable unit at Main Street Well Field in accordance with the NCP and developmental EPA guidance for providing alternate drinking water supplies. The alternatives were grouped into four general categories: 1) no action, 2) new water supply, 3) supplementary water supply, and 4) treatment. The alternatives were evaluated in terms of their ability to protect public health and their technical feasibility and implementability.

Time required to implement was considered a key criteria related to ability to protect public health, in that higher summer water demands necessitate pumping from wells with high contaminant levels, resulting in elevated risk levels. Alternatives which could not meet these individual criteria to at least a moderate degree were eliminated from further consideration. Table 2 presents the initial alternatives and summarizes the results of initial screening.

The following treatment alternatives were advanced to further screening: air stripping, granular activated carbon adsorption, and air stripping followed by granular activated carbon adsorption. Table 4 outlines these alternatives and the criteria upon which they were evaluated. In addition to ability to protect public health and implementability, these alternatives were also evaluated on complexity, reliability, environmental impact, community impact, compatibility with final remedy, and relative cost.

All three alternatives presented below are designed to achieve the same removal efficiencies. Required removal efficiencies are given in Table 3. Design influent concentrations were based on a mass balance of the highest concentrations of the various volatile organic contaminants found in each well. These levels are generally one or two orders of magnitude greater than the levels currently found in all 15 production wells. This conservative design approach was taken to ensure proper operating conditions and efficiencies regardless of discontinuities in the data.

Table 2. COMPARISON OF REMEDIAL ALTERNATIVES

Alternative	Ability to Protect Public Health	Time Required to Implement	Relative Cost	Complexity	Environmental Impact	Community Impact	Ability to Meet Demand	Result of Initial Screening
NO ACTION	Poor	Immediately	Low	Low	High	High	Low	Eliminated; unacceptable for long-term consumption
ABANDON WELL FIELD FOR NEW SUPPLY								
Surface Water Supply								
Elkhart River	Good	3-5 years	High	Moderate	High	Low	Low	
St. Joseph River	Good	3-5 years	High	Moderate	Low	Low	High	Eliminated; extended implementation time
New Well Fields								
Airport Site	Moderate	2-3 years	High	Low	Moderate	Low	High	
Area I--Boot Lake	Good	2-3 years	High	Low	Low	Low	High	
Area II--near Bristol	Good	2-3 years	High	Low	Low	Low	High	Eliminated; extended implementation time
North of 180/90	Good	2-3 years	High	Low	Low	Low	Unknown	
SUPPLEMENTARY WATER SUPPLY								
South Station	Questionable	3-6 months	Moderate	Low	Low	Low	Low	
Bower Street Station	Questionable	3-6 months	Moderate	Low	Low	Low	Low	
Mishawaka, Indiana	Good	1 year to 18 months	High	Moderate	Low	Low	Low	Eliminated; unable to meet demand
Goshen, Indiana	Good	1 year to 18 months	High	Moderate	Low	Low	Low	

Table 2. COMPARISON OF REMEDIAL ALTERNATIVES (Continued)

Alternative	Ability to Protect Public Health	Time Required to Implement	Relative Cost	Complexity	Environmental Impact	Community Impact	Ability to Meet Demand	Result of Initial Screening
TREAT AT WELL FIELD FOR DRINKING WATER								
Separation								
Air Stripping	Good	1 year	Moderate	Moderate	Moderate	Low	high	Consider further
Carbon Adsorption	Good	1 year	Moderate to High	Moderate	Moderate	Low	High	Consider further
Resin Adsorption	Good	1 year	High	Moderate	Moderate	Low	High	Consider further
Destruction								
UV-Catalyzed Ozonation	Moderate	2-3 years	High	High	Low	Low	High	Eliminated; unproven technology
Detoxification								
Dye-sensitized Photo Oxidation	Moderate	2-3 years	High	High	Low	Low	High	Eliminated; unproven technology
Simple Chemical Addition	Low	1 year	Moderate	Low	Low	Low	Low	Eliminated; unproven technology

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Table 3. Required Removal Efficiencies

Contaminant	1 x 10-6 Cancer Risk Level[a] (ppb)	5.8 & 8.8 MGD		16 MGD		Henry's Law Constant
		Design Influent Concentration (ppb)	Required Removal Efficiency %	Design Influent Concentration (ppb)	Required Removal Efficiency %	
1,2-dichlorethane	0.95	3.5	72.9	1.2	20.8	0.05
1,1-dichlorethane	--	11	--	6.6	--	0.24
trichlorethylene	2.8	326	99.1	196	98.6	0.50
tetrachlorethylene	1.0	9	88.9	5.4	81.5	1.1
1,1,1-trichlorethane	21.7	9	--	5.4	--	1.2
trans-1,2-dichlorethylene	--	26	--	16	--	1.2
1,1-dichlorethylene	0.23	7	96.7	4.2	94.5	7.8

NOTES

[a] U.S. EPA CAG

[b] Based on mass balance using highest concentration found in each well.

Alternative 1 -
Air Stripping

This alternative utilizes packed tower air strippers to meet the objectives of the operable unit. Easternmost wells in Main Street Well Field are operated as a barrier/interceptor system, capturing the contaminant plume. Contaminated water from the wells is pumped through the air stripping towers which remove the volatile organic chemicals (VOCs). Pumping strategies would be optimized during conceptual design. Depending on water demand, treated water from the treatment system could be blended with water from uncontaminated wells.

The air stripping treatment system would be designed to achieve 99.1% removal of trichlorethylene (TCE). Of the contaminants frequently detected at Main Street Well Field, TCE is the one detected at the highest concentration,and is the most difficult to remove with air stripping. This removal efficiency would provide finished water at less than a 1×10^{-6} excess lifetime cancer risk.

Alternative 2 -
Granular Activated Carbon Adsorption

This alternative utilizes granular activated carbon (GAC) media to meet the objectives of the operable unit. As with the previous alternative, easternmost wells in the well field are operated as a barrier/interceptor system, capturing the contaminant plume. Contaminated water from the wells is pumped through contact units filled with GAC which adsorbs the VOCs. Pumping strategies would be optimized during conceptual design. Depending on water demand, treated water from the treatment system could be blended with water from uncontaminated wells.

The GAC adsorption system would likewise be designed to achieve sufficient removal efficiencies to provide drinking water at less than a 1×10^{-6} excess lifetime cancer risk.

Alternative 3 -
Air Stripping Followed by Granular Activated Carbon Adsorption

This alternative is a combination of the previous two treatment technologies. As with the previous alternatives, easternmost wells in the well field are operated as a barrier/interceptor system, capturing the contaminant plume. Contaminated water is pumped through air stripping units to remove approximately 70 percent of the contamination, and then through granular activated carbon adsorption units for removal of the vestiges of contamination. Pumping strategies would be optimized in conceptual design. Depending on water demand, treated water from the treatment system could be blended with water from uncontaminated wells.

As with the previous two alternatives, this treatment system would be designed to achieve sufficient removal efficiencies to provide drinking water at less than a 1×10^{-6} excess lifetime cancer risk.

8. Selection Process

The three alternatives identified above were further evaluated in accordance with the NCP to determine the appropriate cost-effective remedy.

During the early stages of the alternatives review, the no action alternative was eliminated from further consideration. The decision was based in part upon an evaluation of the health risks posed by the presence of VOCs in the drinking water provided to the City of Elkhart by the Main Street Well Field, and a recognition of the unlikelihood of a natural reduction in the concentrations of these compounds in the drinking water to or below acceptable levels.

Until the remedial investigation for the Main Street Well Field site is completed, the complete nature and extent of the contamination of the well field is unknown. The implementation of the appropriate operable unit as an interim remedy will minimize and mitigate the contamination of the drinking water provided by Main Street Well Field and reduce the associated health threat to those dependent on the City water supply system. Without the implementation of such a measure, the users of the system are exposed to an unacceptable health risk. Therefore, the no action alternative is not appropriate, as discussed in greater detail previously in the Threat to Public Health section.

As presented in Table 2, alternate water supply sources have limited feasibility. Surface water sources would take extended time to implement. There is no known aquifer in the area sufficiently isolated from potential contamination. Neighboring municipal water systems do not have sufficient existing surplus capacities to provide necessary quantities. Expanding capacities at the City's other two existing well fields has been ruled out due to questionable integrities of the well fields. Only treatment alternatives remain from the initial screening.

The remaining three alternatives -- air stripping, granular activated carbon (GAC) adsorption, and air stripping followed by GAC adsorption, -- are relatively comparable in several terms of the screening criteria used to select the appropriate alternative for the Main Street Well Field site. Table 4 summarizes the detailed comparison of the three developed alternatives. The following criteria were utilized in screening these alternatives: ability to protect public health, time required to implement, complexity/technical feasibility/reliability, environmental impact, community impact, ability to meet demand, compatibility with final remedy, and relative cost. The ability to protect public health is the criterion of primary importance, with time required to implement closely related.

All three alternatives were developed as nearly as possible to achieve equal removal efficiencies, and thus equal protection of public health. Nonetheless, Alternative 1 is slightly inferior to Alternative

2 and 3 in that the air stripping process can only remove volatile organic contaminants, whereas GAC adsorption also has the ability to remove other organic contaminants. However, no such non-volatile organic contaminants have been detected at the Main Street Well Field. Additionally, in contrast to GAC adsorption, air stripping results in VOC emissions to ambient air. The amount of these emissions has been predicted in the Air Management Division evaluation. The predicted increase in risk to public health from these emissions is considered to be an insignificant factor in selecting between the air stripping and GAC alternatives. A detailed analysis of this matter is presented in the Public Health Risk Due to Air Stripper section.

Alternative 1 is superior to Alternatives 2 and 3 in terms of time required to implement. If design is begun in July 1985, Alternative 1 is the only alternative that can be completed before the high demand months of May through August 1986. Design of air stripping units is relatively straight forward, based on influent concentration, necessary removal efficiencies, volatility of the contaminants as expressed by Henry's Law Constant, and air-to-water ratio. By contrast, design of GAC adsorption systems requires operation of a pilot system for approximately 4 to 6 months. Although the basic technology is proven, the data base is not extensive enough to provide specific design parameters covering all conditions and all contaminants; for applications involving mixtures of contaminants, the only accurate method of generating design parameters is to perform pilot tests on similar mixtures. These differences in design are reflected in the time required to implement as shown in Table 5.

Alternative 1 is also slightly superior to Alternatives 2 and 3 in terms of being a less complex treatment technology. Both air stripping and GAC adsorption are proven technologies capable of removing the VOCs at the levels encountered at the Main Street Well Field. GAC is more complex than air stripping because its performance is more difficult to predict, due to variances in the organic and inorganic content of the influent, pH, and temperature. These different conditions found at various sites thus require pilot studies.

As in the two previous categories, Alternative 1 is slightly superior to Alternatives 2 and 3 in terms of ability to meet demand. Since Alternatives 2 and 3 require pilot studies, construction will not be completed in time to meet 1986 summer demand. After completion of construction, all three alternatives are equal in ability to meet demand.

In terms of relative costs, Alternative 1 is an order of magnitude less expensive than Alternatives 2 and 3, and is clearly preferable. This is illustrated in Table 6, comparing present worth costs on a relative basis.

The other screening criteria do not identify any significant differences between the alternatives. No significant environmental impacts or community impacts are expected from any alternative. All three alternatives work towards the likely final remedial measure of minimizing and mitigating groundwater contamination in the area of Main Street Well Field.

Table 4.
DETAILED COMPARISON OF REMEDIAL ALTERNATIVES

Alternative	Ability to Protect Public Health	Time Required to Implement	Complexity/ Technical Feasibility/ Reliability	Environmental Impact	Community Impact	Ability to Meet Demand	Compatibility With Final Remedy	Relative Cost	Result of Detailed Screening
Air Stripping	Good	Good	Good	Good	Good	Good	Good	Good	
Carbon Adsorption	Good	Fair[a]	Fair[b]	Good	Good	Fair[a]	Good	Poor	Eliminated; extended implementation time and high cost.
Air Stripping followed by Carbon Adsorption	Good	Fair[a]	Fair[b]	Good	Good	Fair[a]	Good	Poor	Eliminated; extended implementation time and high cost.

a. Will not be completed in time to meet summer 1986 demand.

b. Requires pilot treatment for proper design.

Table 5.
TIME REQUIRED TO IMPLEMENT

	Alternative 1 Air Stripping	Alternative 2 Granular Activated Carbon Adsorption	Alternative 3 Air Stripping/ Granular Carbon Adsorption
Design	10-12 weeks	30-32 weeks	30-32 weeks
Bidding	8-10 weeks	8-10 weeks	8-10 weeks
Construction	16-20 weeks	16-20 weeks	16-20 weeks
Total	30-42 weeks	54-62 weeks	54-62 weeks

Table 6. COMPERATIVE CASH FLOW TABLE

Year	Alternative 1 (A) Shutdown Production Wells (5.8 MGD)	Alternative 1 (B) Shutdown Production and Barrier Wells (8.8 MGD)	Alternative 1 (C) Entire Well Field (16 MGD)	Alternative 2 (A) Shutdown Production Wells (5.8 MGD)	Alternative 2 (B) Shutdown Production and Barrier Wells (8.8 MGD)	Alternative 2 (C) Entire WellField (16 MGD)	Alternative 3 (A) Shutdown Production Wells (5.8 MGD)	Alternative 3 (B) Shutdown Production and Barrier Wells (8.8 MGD)	Alternative 3 (C) Entire Well Field (16 MGD)
0	1,106,000	1,554,000	2,320,000	4,489,000	6,435,000	11,359,000	4,376,000	6,271,000	11,120,000
1	158,000	208,000	319,000	7,617,000	11,525,000	18,072,000	3,542,000	5,353,000	5,649,000
2	158,000	208,000	319,000	7,617,000	11,525,000	18,072,000	3,542,000	5,353,000	5,649,000
3	158,000	208,000	319,000	7,617,000	11,525,000	18,072,000	3,542,000	5,353,000	5,649,000
4	158,000	208,000	319,000	7,617,000	11,525,000	18,072,000	3,542,000	5,353,000	5,649,000
5	158,000	208,000	319,000	7,617,000	11,525,000	18,072,000	3,542,000	5,353,000	5,649,000
TOTAL	1,896,000	2,584,000	3,915,000	42,575,000	64,060,000	101,719,000	22,086,000	33,036,000	39,365,000
Present Worth[a]	1,705,000	2,342,000	3,529,000	33,363,000	50,124,000	79,866,000	17,803,000	26,563,000	32,534,000
Relative Costs									
(A)	1.00			19.6			10.4		
(B)		1.00			21.4			11.3	
(C)			1.00			22.6			9.22
Overall	1.00	1.37	2.07	19.6	29.4	46.8	10.4	15.6	19.1

a. 10 percent discount rate

9. Community Relations

The Superfund activities at the Main Street Well Field site have been followed closely and consistently by the local media. Interest in Superfund activities has been high, particularly in regard to removal actions ongoing by the U.S. EPA in other areas in Elkhart. The public, with the exception of a few dissenters, has indicated they feel all officials involved (City, County, State and EPA) have responded promptly and properly to groundwater contamination in the area.

Copies of the PFS were made available to the community on June 21, 1985. The Elkhart City Hall and Elkhart Public Library served as information repositories. The U.S. EPA issued a press release June 21, 1985, announcing the availability of the PFS, location of the repositories, the June 21 - July 12 public comment period, and the July 2 public meeting at Elkhart Central High School. The press release also announced a press conference for the afternoon of July 2, 1985.

The press conference was well attended by the local newspaper, radio, and television stations. The public meeting was well attended by the public, as well as the above media. City, County and State officials were also present. At this meeting, the U.S. EPA presented results of the PFS, recommended air-stripping as the preferred alternative, answered questions regarding the Main Street Well Field site, and accepted public comments.

The summary of responsiveness to public comment ("Responsiveness Summary") is attached to this narrative summary (Attachment 1).

10. Consistency with Other Environmental Laws

All three proposed alternatives are consistent with other Federal and State environmental laws.

Alternatives 1 and 3 would result in the discharge of volatile organic compounds (VOCs) into the ambient air. Indiana state law requires that any new source causing air emisions of less than or equal to 25 tons per year of any regulated pollutant, such as VOCs, in excess of either 3 pounds per hour or 15 pounds per day be registered. Registration involves submitting: 1) a description of the facility including design specifications, 2) a schedule for construction, and 3) the nature and amounts of pollutants emitted. Once the information has been submitted, the Indiana State Board of Health (ISBH) must accept the application or request additional information. The ISBH may then impose emission limitations on operating conditions if deemed necessary (Title 325, Indiana Air Pollution Control Board, promulgated September 23, 1981, amendments promulgated April 24, 1984).

The PFS evaluates estimates of potential air emissions from Alternatives 1 and 3. The estimated emissions were developed on a worst case basis, assuming the same design influent concentrations as utilized to size the air stripping towers. The evaluation of public health risk due to air stripping performed by the U.S. EPA Air Management Division also estimated the air emissions on a best case basis, assuming influent concentrations based on concentrations currently detected in the well field (Attachment 5).

Under worst case conditions, Alternative 1 is predicted to emit 18.1 pounds per day, or 3.3 tons per year, of volatile organic compounds. Under best case conditions which are more reflective of predicted operating conditions, Alternative 1 is predicted to emit 1.7 pounds per day, or 0.3 tons per year, of volatile organic compounds.

Alternative 3 utilizes an air stripping process to remove approximately 70 percent of the VOC's before polishing the water with a GAC adsorption system. Under similar worst case conditions, Alternative 3 is predicted to emit 12.9 pounds per day, or 2.4 tons per year, of VOC's. Likewise, under best case conditions Alternative 3 is predicted to emit 1.2 pounds per day, or 0.2 tons per year, of volatile organic compounds.

Thus, in order to provide compliance with applicable State air pollution regulations, both Alternatives 1 and 3 will require registration under Indiana law. Full permitting under Indiana law with the potential for required air emission controls will not be required, even under the worst case scenario. For example, under Alternative 1 the total influent loading to the air strippers would have to increase approximately eight-fold over the worst case analysis before air emission controls might be required. Such an increase would represent a major departure from the highest contaminant levels detected in the individual wells over the last four years, and is not expected to occur.

Spent carbon from the GAC adsorption systems in Alternatives 2 and 3 will need to be disposed of. It is expected that the 4 to 10 million pounds per year of spent carbon will be transported off-site for recycling for industrial use. As a result, no special disposal requirements are expected to result from either of the alternatives utilizing GAC.

Attachment 6 is a floodplain map of the Main Street Well Field vicinity of Elkhart. Examination of the floodplain map indicates that sufficient space exists in the well field outside both the floodplain and floodfringe to allow construction of the treatment systems evaluated in all three alternatives in full compliance with applicable Federal, State, and local regulations. Siting of the recommended alternative's treatment system facilities can thus be accomplished during the remedial design in compliance with floodplain regulations.

11. Assessment of Public Health Risk Due to Air Stripper

U.S. EPA Air Management Division performed a health risk assessment to evaluate the health risks which could arise from the emission of the contaminants as air pollutants if the air stripping technology is implemented as outlined in Alternative 1. The health risk assessment was conducted for predicted air emissions for both worst case and best estimate scenarios as described above in the Consistency with Other Environmental Laws section assuming: 1) influent water flows with contaminant concentrations equal to design concentrations (worst case

evaluation), and 2) influent water flows with contaminant concentrations at current levels (best estimate evaluation). The memorandum summarizing the results and conclusions of this risk assessment is attached (Attachment 5).

As indicated above, the worst case evaluation is based on design influent concentrations, which were developed based on mass balance using the highest concentrations detected in each well previous to the City's implementation of barrier wells. Current concentrations are at least an order of magnitude less. Thus, the best estimate, which uses the current concentrations as its basis, is the appropriate evaluation to consider. The results of the air risk assessment therefore indicate that the public health risk due to air emissions from an air stripper as proposed in Alternatives 1 and 3 are of little significance.

Based on the results of the air risk assessment, it can be concluded that no treatment of emissions to ambient air is necessary for the air stripping systems proposed in Alternatives 1 and 3 in order to further minimize public health risks.

12. Recommended Alternative

The National Oil and Hazardous Substances Contingency Plan (NCP) [40 CFR Part 300.68(j)] states that the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial measure which the agency determines is cost-effective (i.e., the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, or the environment). Based on the evaluation of cost and effectiveness of each proposed alternative, the comments received from the public and the Indiana State Board of Health, and the State and Federal environmental requirements, Alternative 1 has been determined to be the cost-effective alternative.

The recommended alternative is considered an operable unit remedial action. Operable units are similar to initial remedial measures (IRM's) as defined in Section 300.68(e)(1) of the current NCP. This operable unit remedial action for provision of an alternate water supply is appropriate because there is contamination of drinking water at the tap. The objective of this action is to provide those consumers currently dependent on Main Street Well Field for drinking water with a reliable supply of safe, potable water until the final remedial measure(s) may be implemented. The RI/FS to begin in the fall of 1985 will examine appropriate final response action(s).

The recommended alternative provides for packed tower aeration treatment for 5.8 MGD of contaminated groundwater. This capacity represents the lost capacity of the well field due to the shutdown of five contaminated wells. The recommended alternative would be designed and constructed to allow

flexibility in which wells to treat. Pumping strategies will be optimized during conceptual design. The packed tower air stripping system would be designed to achieve 99.1 percent removal of trichloroethylene(TCE), the critical contaminant, and would consist of three packed tower units. This removal efficiency would provide drinking water at less than a 1×10^{-6} excess lifetime cancer risk. The air stripping treatment system would be designed to treat water with influent VOC concentrations based upon the highest concentrations of contaminants detected individually in each of the wells to be treated. Performance of the air stripping treatment system would be frequently monitored to asure that removal efficiencies required to protect public health are consistently achieved.

Main Street Well Field operates at or below this 5.8 MGD capacity 82.5 percent of the time, as shown in Table 7. Water necessary to meet additional demand would be pumped from uncontaminated wells and blended with the air stripped water. With four wells with concentrations currently below detection limits, a combined capacity of 9.8 MGD of clean water can be achieved. Main Street Well Field operates at or below this capacity 98.2 percent of the time. Three other wells with concentrations currently just above detection limits can be utilized to meet maximum daily demand.

If required removal efficiencies are not being achieved, the pumping strategy could be rapidly altered. The seven wells mentioned above could be pumped to meet average daily demand. Water from the air stripping system could be blended with their capacity as necessary to meet higher demands. When not needed for that purpose, the output from the air stripping system could be discharged to Christiana Creek. At such time as full implementation of this contingency plan becomes necessary, piping changes and NPDES permitting would be necessary.

The capital cost of this alternative is estimated to be $1,106,000. The operation and maintenance (O&M) costs are estimated to be $158,000 per year for electric power and operating labor. The five-year present worth cost for the recommended alternative is $1,896,000. All these figures are accurate to +50/-30 percent at this time.

It is recommended that the U.S. EPA fund 90 percent of the O&M costs for a period not to exceed one year after completion of construction. The State of Indiana will provide the 10% O&M match for the first year and will assume all O&M for the life of the project. The U.S. EPA will fund 90% percent of the capitol costs, and the State of Indiana will fund the remaining 10% of capital costs.

13. Recommended Alternative as it Relates to Final Remedy

Operable units are analagous to initial remedial measures (IRM's) as defined in Section 300.68(e)(1) of the current NCP. Currently, the Main Street Well Field supplies drinking water to over 37,000 residents. The

Table 7.
Main Street Well Field
Pumpage Data

Average Daily Demand	6.5 MGD
Daily Demand during Maximum Month	8.8 MGD
Maximum Daily Demand	13.0 MGD

Frequency Distribution

Pumpage, MGD	Frequency, %	Cumulative Frequency, %
less than 3	9.0	9.0
3-4	15.9	24.9
4-5	29.9	54.8
5-6	27.7	82.5
6-7	4.4	86.9
7-8	4.1	91.0
8-9	3.6	94.6
9-10	3.6	98.2
10-11	0.8	99.0
more than 11	1.1	100.1

NOTES
Data based on highest recorded pumpage figures, 1974 through 1984.

residents are exposed or are potentially exposed to a variety of VOCs from the contaminated ground water. These compounds are suspected carcinogens as described previously in the Toxicity of Pollutants section.

A final remedy at this site can be approached by two means, minimization and mitigation of groundwater contamination, and use of an alternative water supply. Although the final remedy for this site has not been determined, it appears likely that some type of response to minimize and mitigate the current groundwater contamination will be the final remedy. It is less likely that the final remedy will be an alternate water supply source.

Attachment 4 chronicles numerous incidents of groundwater contamination in the Elkhart area. This chronicle and the PFS indicate that the Elkhart area relies on a very vulnerable aquifer for its drinking water. The aquifer is a very porous and productive one, consisting of sand and gravel in deposits very close to the surface. Topsoils provide no protective barrier against contaminant intrusion. Subsurface protection at best is minimal due to finger-like clay deposits.

Main Street Well Field is the largest of three City well fields. The City's other two well fields are likewise vulnerable. South Station Well Field is located in proximity to a site of known groundwater contamination by VOCs. Bower Street Well Field is located in an area where shallow residential wells have shown VOC contamination, and its wells have sporadically shown detectable levels of VOCs. The integrity of these well fields as supplements to the production capacity of Main Street Well Field is thus questionable.

Ongoing U.S. EPA removal actions in Elkhart are defining the extent of groundwater contaminant plumes in the Elkhart area. These actions have already led to limited number of hook-ups of some residents to the City water system while numerous other affected residents are being provided bottled water. Serious contamination on a widespread basis could result in a large number of additional hook-ups to the City water system. Consequent increased water demands would further stress well field performances.

The recommended alternative seeks to provide consumers currently dependent on Main Street Well Field for drinking water with a reliable supply of safe, potable water. By appropriately selecting wells in the contaminant plume, plume migration can be managed to prevent further degradation of the well field. Thus it is likely that the air stripping treatment system will be incorporated into a final remedy selected as part of a minimization and mitigation of groundwater contamination, depending on results of the RI/FS.

Treatment and source control are two categories of technologies to address minimization and mitigation of groundwater contamination. It is likely that the final remedy will be either a treatment remedy in combination with source control or standing alone. The air stripping system could be part of either of these final remedies.

In the event that the RI/FS identifies limited localized sources of contamination, the air stripping treatment system could be utilized to treat contaminated groundwater in conjunction with source control measures implemented upgradient as the final remedy. In the event that aquifer contamination is extensive and dilute, source control may not be a viable alternative. Treatment of the aquifer, utilizing the air stripping system with necessary supplements for other types of contaminants or increased capacities, may then be the only means to minimize and mitigate groundwater contamination as a final remedy.

Final remedies at the Main Street Well Field site which do not include minimizing and mitigating groundwater contamination appear unlikely at this point. Alternate water supply sources have limited feasibility. There is no known aquifer in the area sufficiently isolated from potential contamination. Neighboring municipal water systems do not have sufficient existing surplus capacities to provide sufficient quantities. Expanding capacities at the City's other two well fields has been ruled out due to questionable integrities of the well fields. Therefore, the final remedy will likely include minimizing and mitigating groundwater contamination.

Although the air stripping system will not singularly eliminate contamination of the well field aquifer, this operable unit will minimize the threat posed by that contamination until such time as a final remedy is selected by the U.S. EPA and implemented. Until the extent and degree of groundwater contamination is evaluated by the RI/FS, it is not technically feasible to develop a cost-effective, long term remedy for the site.

Thus, the operable unit will effectively meet two U.S. EPA goals, achieving the primary goal of limiting exposure to a significant (potential) health threat by providing safe potable drinking water to those currently dependent on the Main Street Well Field, and also effectively working towards the likely final remedy of mininizing and mitigating groundwater contamination at the Main Street Well Field.

14. State Agreements

Section 104(c)(3) of CERCLA sets forth the State financial responsibilities in remedial actions provided under CERCLA. The State financial responsibilities in the proposed remedial action would include payment or assurance of payment of 10 percent of the costs of remedial action, and assurance of all future maintenance costs of the remedial action.

Although the City of Elkhart owns and operates the well field, the Agency does not currently possess any information to support a finding that the City of Elkhart owned the well field at the time of any disposal of hazardous substances. In fact, due to the nature of the contamination i.e., groundwater contamination, U.S. EPA does not currently possess any information to support a finding that any hazardous substances were disposed of on the well field. It is probable that the source(s) of contamination lies beyond the property boundary of the well field. Therefore, this site is currently subject to the 10% match to Federal Superfund monies spent at this site.

The State of Indiana Health Commissioner has sent the Region V Regional Administrator a letter acknowledging the State financial obligations in this remedial action.

The operation and maintenance (O&M) costs will be covered under a State-Superfund Contract between the State and U.S. EPA at the completion of design of the operable unit.

15. Schedule

The REM II contractor, Camp Dresser & McKee (CDM), will manage the design of the operable unit. The U.S. Army Corps of Engineers (USACE) will procure the construction contractor and oversee construction activities. The schedule for design and construction activities is as follows:

IAG with USACE-MRD for Technical Assistance during Pre-Design	6/17/85
CDM submits draft Pre-Design Report	7/29/85
Approval of Remedial Action (Sign ROD)	7/31/85
CDM submits draft Design Work Plan	7/31/85
IAG with USACE-MRD for Technical Assistance during Remedial Design	7/31/85
Preliminary design (30%) and cost estimate (+30%, -15%) complete	8/2/85
Preliminary design review meeting with EPA, State, and USACE	8/12/85
Preliminary design and cost approval by USACE	8/12/85
Pre-final design (95%) and cost estimate (+15%, -10%) complete	9/6/85
Pre-final design review meeting with EPA, State, USACE	9/12/85
Pre-final design and cost estimate approval by USACE	9/12/85
Advance Notice to Prospective Bidders in Commerce Business Daily	9/13/85

IAG with USACE-MRD for Remedial Action (Advertising and Award, Construction Oversight)	9/13/85
Indiana Environmental Management Board Meeting - State Superfund Contract approval	9/20/85
Remedial Action Obligation	9/20-23/85
Final Design Complete	9/23/85
State Superfund Contract Signed by EPA	9/24/85
Advertise for Competitive Bids	9/30/85
Open Bids	10/30/85
Contract Award	11/15/85
Notice to Proceed	11/30/85
Estimated Construction Period	16-20 weeks
Construction Complete	March - April 1986

16. Future Actions

An RI/FS for the full remedy will be underway this fall. The workplan for the RI/FS will be initiated subsequent to ROD signature. Submission of the RI/FS workplan is projected for late September or October 1985. Objectives of the RI/FS are to determine extent of contamination, determine hazard potential, and evaluate potentially feasible remedial action. The feasibility study will recommend the most cost-effective remedial action(s) for the site. Information gathered during EPA removal actions in Elkhart will allow refinement of the RI/FS, and may suggest additional operable units to be pursued through a phased approach. At present, source control measures seem prudent as the next operable unit.